MINUTES OF DOT-AGC BRIDGE DESIGN SUBCOMMITTEE MEETING

The DOT-AGC Joint Bridge Design Subcommittee met on December 14th, 2005. Those in attendance were:

Berry Jenkins	Manager of Highway Heavy Division, Carolinas Branch AGC (Co-Chairman)
Allen Raynor	Asst. State Bridge Design Engineer
Mark Lively	Crowder Construction
Chris Britton	Taylor & Murphy Construction Co.
Greg Canniff	Rea Contracting, LLC
Erick Frazier	S.T. Wooten Corporation
Ron Hancock	State Bridge Construction Engineer
Tom Koch	Structure Design Project Engineer
Paul Lambert	Structure Design Engineer
Scott Hidden	Support Services Supervisor - Geotech. Eng. Unit
Chris Kreider	Regional Operations Engineer – Geotech. Eng. Unit
David Stark	Structure Design Engineer
Gichuru Muchane	Structure Design Engineer
Emmet Sumner	North Carolina State University
Donlawit Ariyasajjakorn	North Carolina State University
Paul Lackey	North Carolina State University

During the review of the August 10th, 2005 meeting minutes, the following items were discussed:

1. *Special Provision for Crane Safety*
   Mr. Hancock provided an updated on crane safety certification. He noted that:
   - The Department had received information on 3 crane safety certification programs that are currently under considerations for approval.
   - The information on the 3 certification programs will be used to develop guidelines for any third party certification programs seeking approval in the future.

   Mr. Britton suggested the Department train personnel in the Resident Engineer's Offices on the Department's crane safety guidelines for consistency across the state. Mr. Hancock stated that crane safety would be discussed at the Resident Engineers' conference.
2. *Welder Certification*
   Mr. Hancock provided an update on the NCDOT Welder Certification Program. He noted that:
   - The deadline for implementation had been extended to March, 2006, and
   - He encouraged contractors to submit information on similar welder certification programs for consideration of approval.

The minutes of the August 10th, 2005 meeting were approved.

The following items of new business were discussed:

1. *Research on Overhang Falsework Hangers for Bulb-Tee Girders*
   Dr. Sumner gave a presentation on the preliminary findings of NCDOT research project 20015-18 titled *Full Scale Testing of Overhang Falsework Hangers on NCDOT Modified Bulb Tee (MBT) Girders*. The presentation discussed the following:

- Types of hangers investigated – the single-leg Dayton/Richmond (C-24 Type 4-APR) hanger and the double-leg Meadow-Burke (HF-43) hanger,
- Analytical and experimental methodology,
- The loading protocol,
- Experimental observations, results, and
- Preliminary recommendations.

Based on the experimental observations and results, Dr. Sumner noted that:

- The Dayton/Richmond hanger tests resulted in local bearing/spalling followed by excessive rotation of the hanger hood,
- The Meadow Burke hanger tests resulted in severe punching failure of the girder flange followed by flexural rupture of the front (short) leg and then excessive rotation of the hanger hood.
- The manufacturers' published ultimate loads were not achieved for either type of hanger.

- The strength of the hanger assembly was limited by local failure of the concrete in the girder flange.
- The Department should limit the safe working load of either hanger or use the alternate through flange detail for hanger installation.

Mr. Hancock stated that based on the preliminary research results, the Department is developing a special provision and plan note to limit the allowable safe working load of the Dayton\Richmond hanger and to disallow use of the double-leg Meadow Burke hanger.

2. *Increasing Tonnage of HP 12x53 Steel Piles*

Mr. Hidden discussed the background on the proposal to increase the allowable tonnage for HP 12x53 piles by noting that:

- The Department specifies 60 tons of allowable load on HP 12x53 piles.
- The available pile driving equipment historically determined the allowable load specified.
- The allowable load induces very low stresses in the piles.
- The piles are usually driven to rock or very hard subsurface material and therefore the piles have substantially more capacity than the allowable tonnage.
- The Department is in the process of transitioning to bridge designs based on the AASHTO LRFD Specifications. Preliminary studies on the impact of the LRFD specifications suggest that current allowable pile loads will require either additional pile lengths or additional piles.
- The Geotechnical Engineering Unit is proposing increasing allowable pile loads from 60 tons to 75tons for HP12x53 piles, and from 75 tons to 90 tons for HP 14x73 piles.
- Increasing the tonnage on piles will require pile hammers with higher energy capacity.

Mr. Kreider stated that a review of the pile hammer size submittals shows that approximately 30% of the hammers (30 kip-ft. i.e., D-12 and similar, and less) currently in use would have insufficient energy to drive piles to the increased tonnage.

The contractors did not forsee any problems if a D-19 pile hammer or similar is what will be required to drive piles to the increased tonnage. However, they noted that crane reach and pile handling might be of concern for top-down construction projects.

Mr. Kreider stated that he would compile a list of pile hammers types that are of concern.

Mr. Canniff inquired if Pile Driving Analyzer (PDA) tests would provide better information on pile capacity than the crane tonnage. Mr. Hidden stated that the Department will be performing more PDAs than in the past, so that foundation designs will be based on resistance factors that account for the PDA data.

Mr. Hancock stated that the AASHTO LRFD Specifications will be implemented on projects designed after October, 2007. He stated that the Department was alerting contractors now so that they will have adequate time to make adjustments to any design implications.

Mr. Hidden also discussed revisions to the plan notes for piles. The most significant revision is intended to clarify the Department's position on payment for piles when the contractor is given the option to substitute steel piles in lieu prestressed concrete piles. Revisions to other notes were to provide the contractor with more detailed information on pile driving requirements, and to provide consistency between the plan notes and existing practice.

3. *New Pile Driving Equipment Data Form*

Mr. Hidden distributed and presented an overview of the new Pile Driving Equipment form, which was developed by the Geotechnical Engineering Unit. To streamline the submittal process, the form will be available electronically and contractors are encouraged to submit it electronically.

Contractors suggested a few minor modifications, such as making provisions for layered pile cushion material on the form. In addition, the contractors had some concerns on the frequency of hammer cushion inspection, especially when the same hammer is used on concurrent projects or a short period had elapsed between projects. Mr. Hidden stated that the hammer cushion inspection process is addressed in the new 2006 Standard Specifications and may be required by the Engineer. Mr. Hidden also noted that the new form has a place for the last inspection date such that the Resident Engineer can reasonably determine if an inspection is necessary.

Mr. Jenkins suggested that the Department send notification of the new form to him and that he would distribute it. Mr. Hancock suggested a notice or email be sent out with lettings.

4. *Flat Faced Barrier Rail*

Mr. Koch distributed a sketch on a flat-faced rail/parapet that the Structure Design Unit is considering for use on box beam and cored slab bridges. He noted that:

- The rail would accommodate more efficient through-the-rail drainage slots, which are less prone to debris blockage.
- The rail is a very cost competitive and safe option.
- The FHWA tentatively approves of the flat-faced rail from a safety perspective.

The contractors were in favor of the rail, especially because it allows the option to slip-form or hand form it. They noted that the ability to hand form the barrier rail in rural areas may yield some cost savings. Also, use of the flat face shape will eliminate the need for the transition barrier.

5. *Payment for CSL Tubes*
   Mr. Hancock sought to clarify the method of payment for Crosshole Sonic Logging (CSL) tubes. He stated that the Special Provision was recently changed to make CSL tubes incidental to the per linear foot prices of the drilled shaft.

6. *Weight Estimates for Spiral Reinforcement*
   Contractors had raised some concerns on how the Structure Design Unit estimates the weight of spiral reinforcement. Mr. Muchane distributed a detailed sample spiral weight estimate calculation, and Structure Design Manual Figure 10-9, which shows how Structure Design estimates the weight of spiral reinforcement. Mr. Muchane added that differences in the weight estimates are often a result of using slightly differing diameters for the spiral.

7. *Other*
   i. Mr. Canniff raised concern over time frames and inconsistencies concerning obtaining hauling permits for overweight and oversized loads. He was particularly concerned with hauling of girders.

      Mr. Hancock stated that similar concerns have been brought up at recent PCI Meetings. He suggested that a combined list of specific concerns might help in advancing the discussion. After receiving comments, he will set up a meeting with the Permitting Group to relay these concerns and look for ways to improve the process.

8. *Next Meeting*
   The next meeting is scheduled for February 8th, 2006 in the Structure Design Conference Room C. Other meeting dates for 2006 were tentatively scheduled for April 12, June 14, August 9, October 11, and December 13.